Spot Safety Project Evaluation

Project Log # 200501218

Spot Safety Project # 11-99-210

Spot Safety Project Evaluation of the Median Directional Crossover Installation and the Left Turn Storage Lanes Extension at the Intersection of US 321 / Hickory Blvd and SR 1796 – Victoria Ct / Clover Dr in Caldwell County.

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator

_____ 02/08/2006
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Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 11-99-210 – The Intersection of US 321 / Hickory Blvd and SR 1796 / Victoria Ct / Clover Dr in Caldwell county.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis has been completed to measure the effectiveness of the spot safety improvement. Additional analysis methods were not utilized for this evaluation because a suitable comparison group was unattainable. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of channelization to convert a full movement crossover to a directional crossover and the extension of the left turn storage lanes at the intersection of US 321 – Hickory Blvd and SR 1796 – Victoria Ct / Clover Dr. US 321 / Hickory Blvd is a 4 lane divided road with exclusive right turn and left turn lanes at SR 1796 / Victoria Ct / Clover Dr. US 321 has a speed limit of 55 mph. The intersection of US 321 and SR 1796 is controlled by stop signs. US 321 is a high speed high volume roadway with heavy congestion throughout the day. The statement of the problem was the crash experience indicated a pattern of collisions involving motorists attempting to cross US 321 from SR 1796 / Victoria Ct / Clover Dr. Businesses exist along both sides of US 321 at the treatment location.

The initial crash analysis for this location was completed from September 1, 1996 through September 1, 1999 with a total of fifteen (15) reported crashes. There were seven Angle crashes, three Sideswipe crashes and one Left Turn crash, which were deemed correctable by the improvement. There was one Fatality, one class A injury, one class B injury and two class C injuries resulting from these crashes. The final completion date for the improvement at the subject intersection was on October 13, 2001 with a total cost of $45,000.00.

Naïve Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from September 1, 2001 through November 30, 2001. The before period consisted of reported crashes from January 1, 1998 through August 31, 2001 (3 Years and 8 months) and the after period

consisted of reported crashes from December 1, 2001 through July 31, 2005 (3 Years and 8 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet from the intersection of US 321 and SR 1796 / Victoria Ct / Clover Dr. The following data tables depict a summary of the overall crash data and the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Crash Data Summary:	**Before Period**	**After Period**	**Percent Reduction (-) / Percent Increase (+)**
Total US 321 Strip Crashes	92	57	-38.0
Target US 321 Strip Crashes	37	11	-70.3
Total Crossover Section Crashes	16	5	-68.8
Target Crossover Section Crashes	12	2	-83.3
Influenced Intersections :			
Intersection A "US 321 @ SR 1164"			
Total Crashes	10	4	-60.0
Target Crashes	7	2	-71.4
Intersection B "US 321 @ Ideal Dr"			
Total Crashes	12	4	-66.7
Target Crashes	6	2	-66.7

Crossover Section Information:

	Before Period	**After Period**	**Percent Reduction (-) / Percent Increase (+)**
Total Crashes	**16**	**5**	**-68.8**
Fatal Crashes	2	0	-100.0
Non Fatal Injury Crashes	5	3	-40.0
Total Injury Crashes	7	3	-57.1
PDO Crashes	9	2	-77.8
Night Crashes	5	1	-80.0
Wet Crashes	3	1	-66.7
Alcohol/ Drug Crashes	1	0	-100.0
Severity Index	**17.06**	**5.44**	**-68.1**
Fatal Injuries	2	0	-100.0
Class A	2	0	-100.0
Class B	1	3	200.0
Class C	7	3	-57.1
Non-Fatal Injuries	10	6	-40.0
Total Injuries	12	6	-50.0

	Before Period	After Period	Percent Reduction (-) / Percent Increase (+)
Total Target Crashes	**12**	**2**	**-83.3**
Fatal Crashes	2	0	-100.0
Non Fatal Injury Crashes	5	2	-60.0
Total Injury Crashes	7	2	-71.4
PDO Crashes	5	0	-100.0
Night Crashes	4	0	-100.0
Wet Crashes	2	0	-100.0
Alcohol/ Drug Crashes	1	0	-100.0
Severity Index	**22.42**	**8.4**	**-62.5**
Fatal Injuries	2	0	-100.0
Class A	2	0	-100.0
Class B	1	2	100.0
Class C	7	2	-71.4
Non-Fatal Injuries	10	4	-60.0
Total Injuries	12	4	-66.7
ADT	**28600**	**29200**	**2.1**

Crash Type Summary	Before	After	Percent Reduction (-)/ Percent Increase (+)
Angle	11	0	-100.0
Left Turn, Same Roadway	2	2	0.0
Ran Off Road - Right	1	1	0.0
Rear End, Slow or Stop	0	2	N/A
Sideswipe, Same Direction	2	0	-100.0

The naive before and after analysis at the subject crossover resulted in an 68.8 percent decrease in Total Crashes, a 68.1 percent decrease in the Total Severity Index, and a 2.1 percent increase in Average Daily Traffic (ADT). There was also an 83.3 percent decrease in Target Crashes and a 62.5 percent decrease in the Target Crashes Severity Index. The before period ADT year was 1999 and the after period ADT year was 2003. From the above analysis it appears that the treatment site has had a decrease in both Total and Target crashes from the before to the after period. From the crash type summary table it can be seen that Angle type crashes were reduced significantly by 100.0 percent from the before to the after period and this can be attributed to the improvement.

US 321 Strip Section:

US 321 Strip Data Summary	Before Period	After Period	Percent Change
Total Crashes	**92**	**57**	**-38.0**
Severity Index	8.12	6.13	-24.5
Target Crashes	**37**	**11**	**-70.3**
Severity Index	5.05	3.02	-40.2

Analysis for a section of US 321 from MP 9.522 to MP 11.688 including all crashes within 150 ft Y line was conducted with the following results: a 38.0 percent decrease in Total crashes, a 24.5 percent decrease in Total severity index, a 70.3 percent decrease in Target crashes and a 40.2 percent decrease in Target crashes severity index. From the above analysis it appears that the treatment strip has had a decrease in both Total and Target crashes from the before to the after.

Additional Analysis

In order to test for crash migration, a naïve before and after analysis was also performed at the two following Intersections:

Location 1 – The intersection of US 321 and SR 1164 / Joyceton Church / Timber Drive located approximately 0.27 miles south of the treatment site.

Location 2 – The full movement crossover type Intersection of US 321 and SR 1774 Eastwood Park Drive / Ideal Drive located approximately 0.61 miles north of the treatment site.

The data for both intersections consisted of all crashes within a 150 feet Y-line. The following tables are a summary of the naïve before and after analysis for both the Total Crashes and Target Crashes at the two influenced intersections.

Location 1 – US 321 at SR 1164 – Joyceton Church – Timber Drive:

	Before Period	After Period	Percent Reduction (-) / Percent Increase (+)
Total Crashes	10	4	-60.0
Total Target Crashes	7	2	-71.4

The naive before and after analysis at the Intersection of US 321 and SR 1164 / Joyceton Church / Timber Drive resulted in a 60.0 percent decrease in Total Crashes and a 71.4 percent decrease in Target Crashes. From the above analysis it can be seen that the intersection of US 321 and SR 1164 has had a decrease in both Total and Target crashes from the before to the after period. This may indicate that the improvement had a minimal effect on this particular intersection.

Location 2 – US 321 at SR 1774 – Eastwood Park – Ideal Drive:

	Before Period	After Period	Percent Reduction (-) / Percent Increase (+)
Total Crashes	12	4	-66.7
Total Target Crashes	6	2	-66.7

The naive before and after analysis at the Intersection of US 321 and SR 1774 Eastwood Park Drive / Ideal Drive resulted in a 66.7 percent decrease in Total Crashes and a 66.7 percent decrease in Target Crashes. From the above analysis it can be seen that the intersection of US 321 and SR 1774 has had a decrease in both Total and Target crashes from the before to the after period. This may indicate that the improvement had a minimal effect on this particular intersection.

Results and Discussion

The naive before and after analysis at the Treatment location resulted in a 68.8 percent decrease in Total Crashes and a 68.1 percent decrease in the Total Severity Index. Analysis of the treatment location also resulted in an 83.3 percent decrease in Frontal Impact Crashes and a 62.5 percent decrease in the Frontal Impact Crashes Severity Index. The summary results above demonstrate that the treatment location appears to have had a decrease in both Total and Target crashes from the before to the after period and this can be attributed to the improvement. Looking only at the Angle type crashes, they were reduced significantly from the before to the after period (100.0 percent decrease). There was also a significant decrease in the Sideswipe crashes (100.0 percent decrease).

As previously mentioned the improvement chosen for the subject location was constructing raised concrete islands in order to convert the existing full movement crossover to a directional crossover and extending the length of the left turn storage lanes. As a result the improvement will prevent through and left turn movements for SR 1796 – Victoria Ct / Clover Dr. Motorists wishing to make these movements need to find an alternative route (i.e. potential crash migration occurs). Therefore, the effect of the treatment location on the surrounding median crossovers and intersections must remain in consideration while assessing analysis of the Treatment Intersection.

The naïve before and after analysis of the potential influenced intersections resulted in a 60.0 percent decrease in Total crashes and a 71.4 percent decrease in Target crashes from the before to the after period for the first location (US 321 @ SR 1164 – Joyceton Church / Timber Dr). For the Second location (US 321 @ SR 1774 – Eastwood Park / Ideal Dr) there was a 66.7 percent decrease in Total crashes and a 66.7 percent decrease in Target crashes from the before to the after period. The above statistics show minimal effect on both locations by the improvement. Additional analysis for a section of US 321 from MP 9.522 to MP 11.688 resulted in a 38.0 percent decrease in Total crashes and a 70.3 percent decrease in Target crashes. Please *see the attached Treatment Site Location map, Photos and Collision Diagrams.*

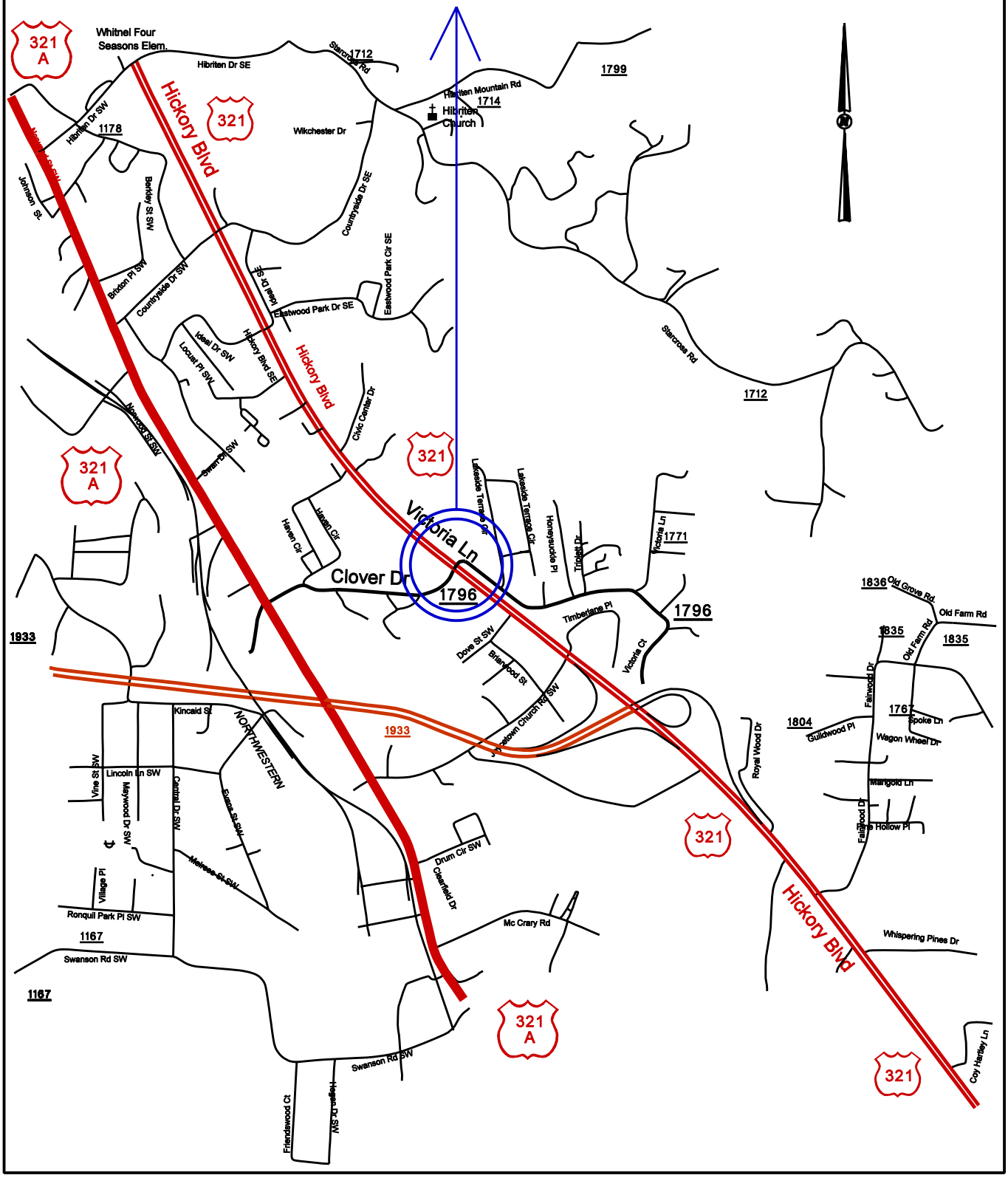
As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Evaluation of Spot Safety Project Number 11–99–210

Location Map, Caldwell County

Treatment Site:

US 321 – Hickory Blvd at SR 1796 – Victoria Ct/Clover Dr



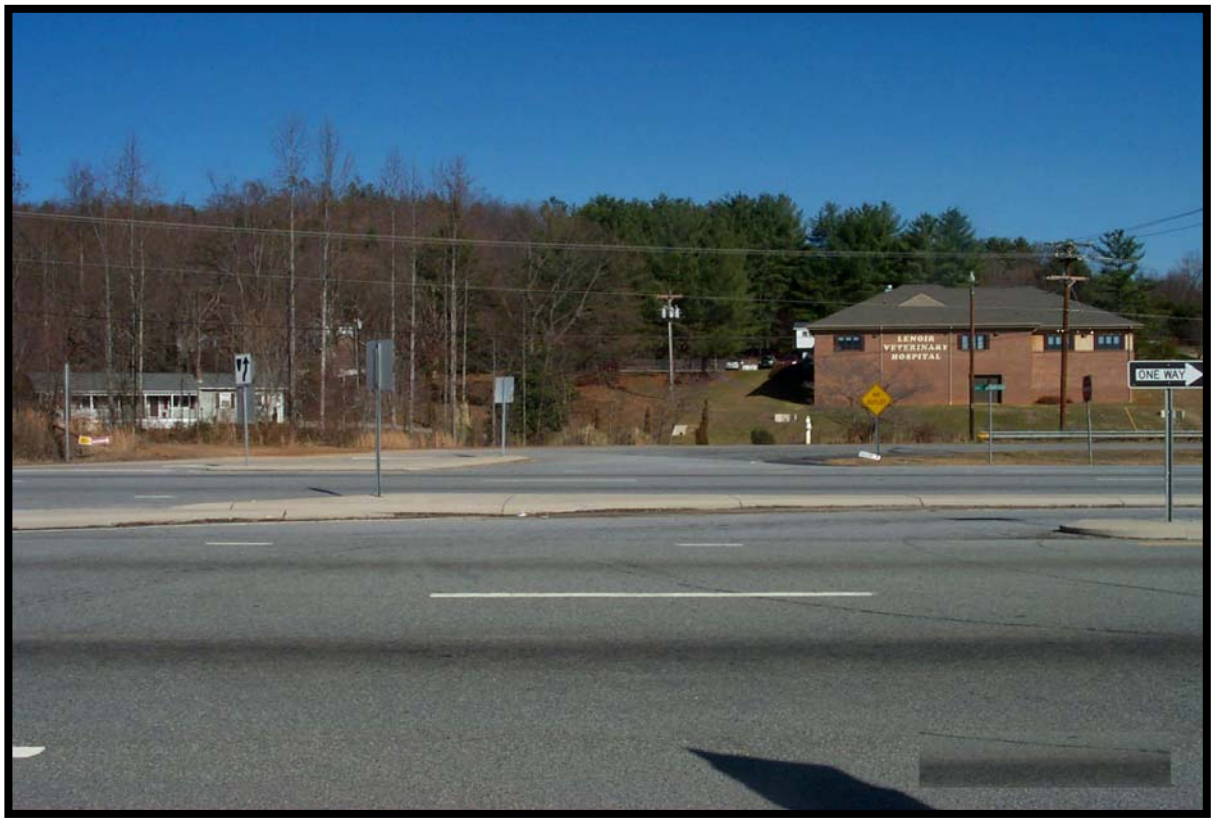
location map.dgn 05/04/2006 02:13:10 PM

Treatment Site Photos Taken on January 12, 2006

Looking north on US 321 / Hickory Blvd at the crossover location

Looking north on US 321 / Hickory Blvd at the crossover location

Looking east at the crossover location from Clover Dr



Looking east at the crossover location from Clover Dr

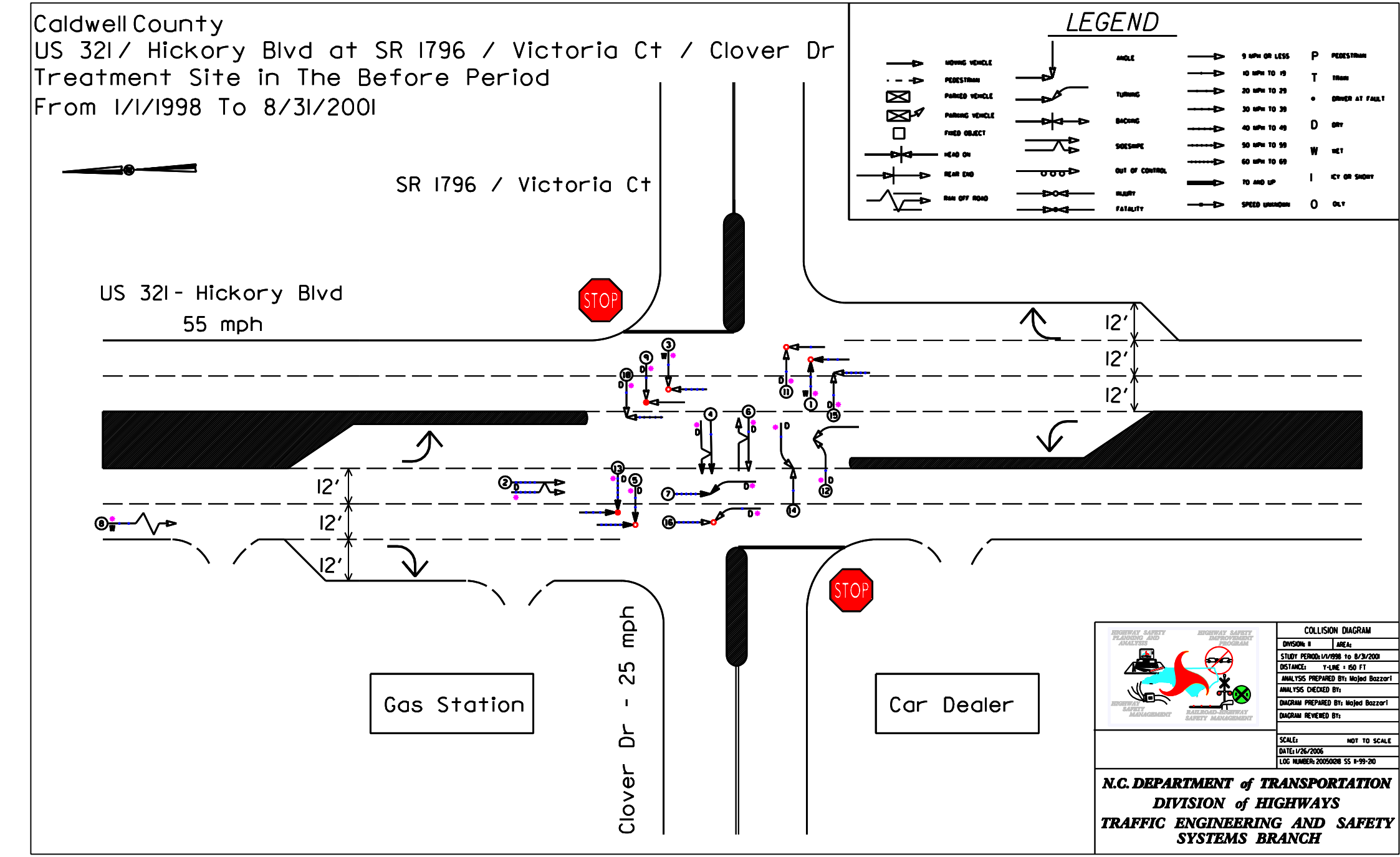
Looking North on US 321 – Hickory Blvd

Looking South on US 321 – Hickory Blvd at the crossover location

Looking South on US 321 – Hickory Blvd

Looking west on the crossover location from SR 1796 / Victoria Ct

Caldwell County
US 321 / Hickory Blvd at SR 1796 / Victoria Ct / Clover Dr
Treatment Site in The Before Period
From 1/1/1998 To 8/31/2001



COLLISION DIAGRAM
DIVISION: 8 AREA:
STUDY PERIOD: 1/1/1998 to 8/31/2001
DISTANCE: Y-LINE = 150 FT
ANALYSIS PREPARED BY: Majed Bazzari
ANALYSIS CHECKED BY:
DIAGRAM PREPARED BY: Majed Bazzari
DIAGRAM REVIEWED BY:
SCALE: NOT TO SCALE
DATE: 1/26/2006
LOG NUMBER: 20050208 SS 8-99-210

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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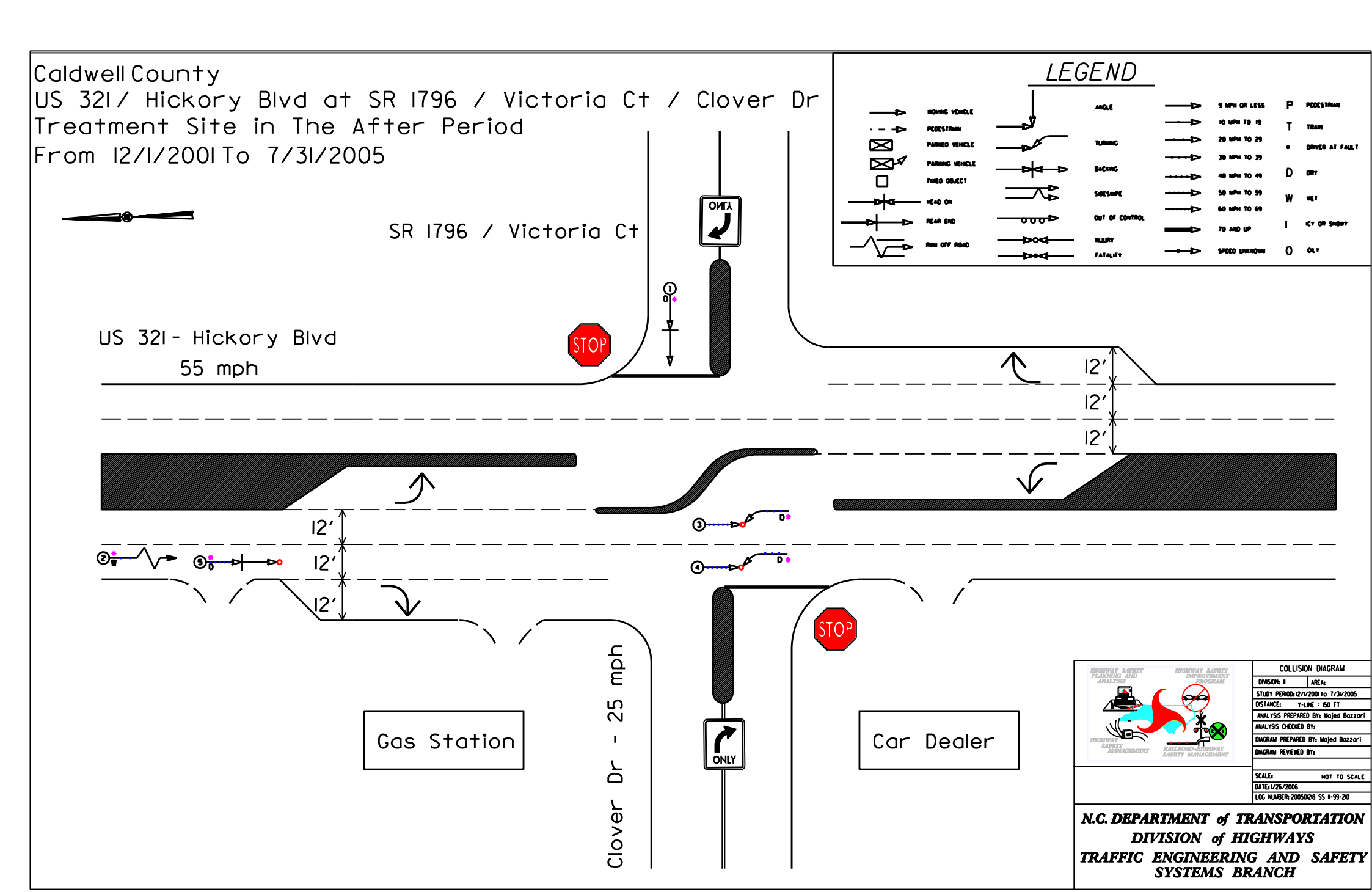
Caldwell County
US 321 / Hickory Blvd at SR 1796 / Victoria Ct / Clover Dr
Treatment Site in The After Period
From 12/1/2001 To 7/31/2005



COLLISION DIAGRAM
DIVISION: 8 AREA:
STUDY PERIOD: 12/1/2001 to 7/31/2005
DISTANCE: Y-LINE = 150 FT
ANALYSIS PREPARED BY: Majed Bazzari
ANALYSIS CHECKED BY:
DIAGRAM PREPARED BY: Majed Bazzari
DIAGRAM REVIEWED BY:
SCALE: NOT TO SCALE
DATE: 1/26/2006
LOG NUMBER: 20050208 SS 8-99-20

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
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